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Runoff Infiltration Systems

USDA, Natural Resources Conservation Service

Scope

This Conservation Practice Standard applies to the design and installation of infiltration systems and infiltration system components to provide for the collection and infiltration of snowmelt and storm runoff from roofs and other impervious surfaces.

This is a local amendment to NRCS Conservation Practice Standard 570, Runoff Management System. This practice covers the design and installation of drywells, trenches, and other infiltration systems.

Background

The purpose of an infiltration system is to collect and infiltrate runoff from impervious surfaces such as roofs, driveways and parking areas, while preventing erosion of the soil surface caused by runoff.

An infiltration system should be located at the dripline of roofs or adjacent to other impervious surfaces, such as paved driveways and parking areas.

This infiltration system design sheet is applicable to homes, garages, parking areas and driveways within the Lake Tahoe Basin, having less than 2,700 square feet of impervious surface (equivalent to 225 cubic feet of runoff volume). Runoff collected by a gutter and downspout system can be discharged in an infiltration system or into a separate infiltration structure, with no excavation to exceed 3 feet in depth.

On very steep slopes, shallow soils, poorly drained soils or where infiltration may saturate a foundation a subsurface drain should be used to collect and transport runoff to an acceptable location for storage and infiltration (refer to the NRCS *Subsurface Conveyance Fact Sheet*).

Infiltration System Design

Dimension designs for infiltration systems are found on a BMP Retrofit Site Evaluation [Contact your local Conservation District at (530) 543-1501. Design dimensions are based on a 94% void space prefabricated infiltration system or a 33% void space rock infiltration system. Adjustments must be made to convert between different void space systems. Vegetated swales and engineered retention ponds are another possible alternative. Many other products exist to capture, store and infiltrate roof dripline and driveway runoff water. This Fact Sheet does not endorse, recommend or specify any given product.

The design of an infiltration system structure is dependent on:

- The design storm (a 20 year – 1 hour storm event, or 1 inch of precipitation in 1 hour).
- The soil permeability where infiltration is desired.
- The storage volume of the structure selected.
- The area of the impervious surface.

This information can be determined by contacting your local office of the Natural Resources Conservation Service (NRCS).

Undisturbed soils in the Lake Tahoe Basin that display **rapid and very rapid permeability** have the capacity to infiltrate the runoff from a 1-inch 1-hour storm event from a typical residential roof. A gravel mulch layer 3" in depth under drip-lines is sufficient to protect rapid and very rapid soils from erosion while allowing the runoff to infiltrate without the requirement of additional storage.

To account for the variable infiltration rates of disturbed soils that can occur at constructed home sites, a "safety" storage capacity of at least 3.5 cubic feet of storage volume should be installed at the down slope end of a gravel mulch infiltration system. This applies where roof widths are less than 19.5 feet. One 3.5 cubic foot storage structure at the lower end of every infiltration system, regardless of soil permeability, is required as a safety factor as well as allowing for an ideal location to monitor results of this practice and allow for future maintenance.

Constructed home sites on slopes, with moderately, or slow permeability, require additional infiltration capacity as described in a BMP Retrofit Site Evaluation.

Installation

Refer to the attached drawings to properly locate and install your infiltration system. Subsurface or surface conveyance can be used to transport collected water from a non-desirable infiltration location to a more appropriate location.
Other engineered roof runoff capture, storage and infiltration systems not mentioned here may be used, when designed to meet all local ordinances

1. Determine appropriate dimensions based on a BMP Site Evaluation.
2. If disturbing more than 3yd^3 of soil contact TRPA for permitting. Install proper temporary BMPs to protect soils.
3. Infiltration systems must not adversely affect nearby foundation or footings.
4. Gravel mulch under drip-lines should be 18 inches wide and at least 3 inches deep. When the drip-line is 32 feet or higher above the mulch, the width should be 24 inches wide for splash protection. Bordering structures should be used to isolate gravel armor. Infiltration systems must not adversely affect nearby foundations or footings.
5. Excavate dimensions. For prefabricated structures leave 2 extra inches on all sides. Allow for 4-6" extra depth. It is recommended that on difficult or large sites 2" of gravel be laid to even and level the base of the excavated area.
6. Storage and infiltration structures must be installed level and along the contour of the existing slope.
7. A geo-grid is necessary to protect the top of prefabricated structures and zip-ties must be used to anchor it to the prefabricated system.
8. Geo-textile filter fabric must be wrapped around all prefabricated storage structures with 10" of overlapping fabric at all seams.
9. Backfill sides of prefabricated structures.
10. Cover prefabricated structures with a minimum of 3" gravel.
11. A drainage inlet device to allow inflow of water into the prefabricated structure is necessary. Grating is recommended for ease of maintenance. Downspouts or sub-surface conveyance with relatively clean runoff may be piped directly into drywells.

Trench Installation

Gravel Trenches are often improperly installed as infiltration systems. When on a slope, by default they serve as conveyance and their infiltration storage capacity is limited. Infiltration trenches are applicable on many sites, but must not be installed on a slope.

A stair-stepping infiltration system on a slope may be appropriate. 40" of soil must separate infiltration wells from each other. (see Diagram)

Maintenance

- Infiltration systems require maintenance in order to continue to be effective. Accumulated debris over the gravel mulch must be removed periodically. Storage facilities need to be regularly checked and accumulated sediment removed to keep available storage space open. A clean-out port can be used as a means to access storage facilities for easy maintenance.

For further information contact:

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